

Theory- and evidence based interventions for children with conduct problems: Exploring  
applicability and underlying assumptions in real world settings



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## Summary

Severe child conduct problems (aggressive, disruptive, destructive, oppositional, non-compliant and antisocial behavior) are predictive of serious and violent offences, substance use problems, mental health problems and domestic violence later in life (Moffitt, 2006). Left untreated, as many as 50% to 75% of the children with severe and early conduct problems will exhibit antisocial behavior in adolescence (Nixon, 2002). However, early trajectories of conduct problems can be altered (Brestan & Eyberg, 1998; Lundahl, Risser, & Lovejoy, 2006; Nixon, 2002) and the development of interventions targeting child conduct problems has been an important area of research in the last decades (e.g. Dishion & Patterson, 2006; Webster-Stratton, Reid, & Hammond, 2004). The social interaction learning (SIL) model postulates that contextual factors (e.g. divorce, stress, SES) initiate coercive and aggressive interactions between family members and disturb parenting skills, thereby leading to an early onset path of antisocial behavior (Patterson, 1982). In other words, contextual factors are assumed to impact child adjustment indirectly through parenting practices.

The present thesis has examined the applicability and underlying assumptions of theory- and evidence based prevention and treatment interventions in real world setting, namely Parent management training, the Oregon model and the community-wide model called “the Early Intervention for Children at Risk for Developing Behavioral Problems” (EICR). The principles of these interventions are derived from the SIL model. In order to study processes leading to conduct problems, Paper I examined whether the effect of interparental collaboration was mediated through maternal and paternal parenting. Two studies were carried out to investigate the applicability of interventions in real world settings. The study presented in Paper II explored whether the implementation of the EICR model in a community was related to reduced problems behaviors and better child relations in the school

context. The study presented in Paper III examined gender differences in behavioral change following PMTO.

The cross-sectional findings in Paper I were derived from a sample of families (N = 136) from all health regions in Norway who had been in contact with child and adolescent psychiatric services to get help with their child's conduct problems prior to receiving PMTO. Paper II, which was based on a quasi-experimental pre-post design, consisted of a sample of school employees (N = 266) recruited from a pool of 271 employees from seven elementary schools (1st–7th grade) in a municipality near Oslo. The sample in Paper III consisted of 323 families who received PMTO, of which 239 (74%) participated in assessment sessions before (pre) and after (post) treatment.

Findings from Paper I showed that maternal and paternal parenting practices fully mediated the relation between interparental collaboration and externalizing behavior. However, when the indirect effects of parenting practices were tested separately, paternal parenting functioned as a mediator, whereas maternal parenting did not, indicating that the relation between interparental collaboration, parenting and externalizing behavior was moderated by parent gender. The finding that interparental collaboration influenced child externalizing behavior indirectly through parenting practices suggests the importance of addressing interparental communication skills, teamwork and consensus during parent training interventions when parents are in a problematic relationship: Helping parents communicate and cooperate more efficiently seems to make it easier for parents to interact more positively with their children.

The results from Paper II showed that the EICR model had positive short term effects (one year after initiation) in the sense that the prevalence of student problem behavior was significantly lower, and student relations were significantly better in schools located in the intervention area than in schools located in the comparison area. The positive immediate



effects indicate that the implementation of the EICR model, which in fact only directly affects a small portion of the child population, can have positive impacts on the overall prevalence of child problem behavior in municipalities.

Pre treatment findings from Paper III showed that girls exhibited less externalizing problem behavior according to parents and teachers, more internalizing problems according to parents, and more social competence according to teachers. Parents reported more girls to be within clinical range on externalizing behavior, while teachers reported more boys to be within clinical range. Teachers reported more comorbidity among boys than girls. At post treatment, girls had more likely changed in a positive direction according to teacher-ratings of externalizing behavior and social competence, but not according to any of the parent-reported variables.

The findings from the present thesis provide support for the SIL model, thereby suggesting that it may be a beneficial strategy to offer interventions derived from the model to children with conduct problems in Norway. Despite promising findings, further research is needed to develop and refine interventions for children with severe conduct problems.

## List of papers

### Paper I

Kjøbli, J., & Hagen, K. A. (2009). Interparental collaboration, parenting and child externalizing behavior in a clinical sample: Testing mediation. *Family Relations*. Acceptance of revised manuscript is pending.

### Paper II

Kjøbli, J., & Sørli, M. (2008). School outcomes of a community-wide intervention model aimed at preventing problem behavior. *Scandinavian Journal of Psychology*, 49, 365–375.

### Paper III

Kjøbli, J., & Ogden, T. (2009). Gender Differences in Intake Characteristics and Behavior Change among Children in Families Receiving Parent Management Training (PMT). *Children and Youth Services Review*. Submitted.

# **1 Introduction**

## **1.1 Conduct problems**

### **1.1.1 Definition of conduct problems**

Conduct problems in children refer to aggressive, disruptive, destructive, oppositional, and non-compliant behavior (Campbell, Shaw, & Gilliom, 2000). A child with conduct problems is characterized by exhibiting behaviors that break existing rules, norms and expectations of society to such a degree that it impedes the development and learning of the child or other children and/or disrupts or hampers the child's positive social interactions with other children and adults (Ogden, 1998).

The term conduct problems relate to oppositional defiant disorder (ODD) and conduct disorder (CD), which are psychiatric diagnoses included in the DSM-IV (American Psychiatric Association, 2000). A diagnosis of these disorders can be made when conduct problems become repetitive, stable and pervasive (i.e. in multiple settings, such as home, school and community). ODD reflects inappropriately high levels of problematic childhood behaviors, such as anger, hostility, disobedience and defiance. ODD has by some been viewed as a precursor of CD, and the latter diagnosis has been considered more serious, reflecting a persistent and problematic behavioral pattern that exceeds age-appropriate norms and rules (Loeber, Burke, Lahey, Winters & Zera, 2000). Symptoms for CD include physical fighting, cruelty towards people and animals, robbery, truancy from school.

In the literature, the term conduct problems has occasionally been used interchangeably with externalizing behavior problems and antisocial behavior. Similar to conduct problems, externalizing behavior includes a range of disruptive and rule-breaking behaviors, such as temper tantrums, stealing, truancy, cruelty and criminal acts. Furthermore, as operationalized by Achenbach (1991), externalizing behavior can be separated into the sub-

scales aggression and delinquency. Also, the definition of antisocial behavior is very close to the term conduct problems, encompassing behaviors that are experienced as unpleasant, disruptive or aversive by people close to the child, such as parents, teachers and peers (Dishion & Patterson, 2006; Loeber & Schmalzing, 1985). Noteworthy, a distinction between overt and covert behavior has been made: Overt antisocial behavior is distinguished by aggressive, non-compliant and oppositional behaviors that can be detected by adults. In contrast, covert antisocial behaviors, such as vandalism, stealing, lying and spreading rumors, are performed in such ways that adults are not able to discover who the perpetrator was. Dishion and Patterson (2006) argue that overt and covert antisocial behaviors belong to the same construct, but that overt antisocial behavior is more typically performed during early childhood, while covert antisocial behavior becomes more salient from age 6 years and accelerates during adolescence. Because there is a great overlap between conduct problems, externalizing behavior problems and antisocial behavior, the terms are used interchangeably in the present thesis.

Most children display some forms of disruptive behaviors in certain periods and/or settings as part of their normal development, which can be seen as attempts to test limits, establish independence, master challenges in the environment and practice social skills. In particular, during the first 2 years of life it can be quite common for children to be oppositional and non-compliant (Dishion and Patterson, 2006; Keenan & Wakschlag, 2000). Correspondingly, in a recent study, children's overt conduct problems generally decreased in frequency over the age period from 2 to 9 years (Miner & Clarke-Stewart, 2008), a finding that is consistent with previous studies (Shaw, Gilliom, Ingoldsby & Nagin, 2003; Patterson, Shaw, Snyder & Yoerger, 2005). The negative developmental slope of overt externalizing behavior has been found across teacher, parent and observer assessments (Dishion & Patterson, 2006). By the end of preschool, and at the beginning of elementary school, overt

conduct problems are quite uncommon among typically developing children. Still, a small, but yet substantial portion of children with severe conduct problems continue to exhibit these overt behaviors frequently, chronically and pervasively (Campbell, Shaw & Gilliom, 2000). Therefore, frequency, stability and pervasiveness of conduct problems are important markers for whether children are on a trajectory of antisocial behavior and delinquency later in life. Rates of children with severe and persistent conduct problems have been found to be from 5% to 7% (Nagin & Tremblay, 1999; Moffitt, Caspi, Dickson, Silva & Stanton, 1996; Shaw, Gilliom, Ingoldsby & Nagin, 2003).

### **1.1.2 Early onset of conduct problems and prognosis**

Longitudinal studies have shown that adolescent and adult antisocial behavior and criminal involvement often have roots in conduct problems that begin in early childhood (e.g. Moffitt & Caspi, 2001). Young children characterized with pervasive and chronic conduct problems are often referred to as individuals with an “early onset” (Patterson & Yoerger, 2002) or “life course persistent antisocial” individuals (Moffitt, 1993; Moffitt, 2006). Longitudinal research has found that individuals on the life-course persistent path are recognized as early as the age of 3 by having a difficult temperament and cognitive deficits (see Individual child risk factors). This finding has been supported by studies indicating moderate to strong continuity for children beginning as early as 2-3 years of age to exhibit frequent, severe and pervasive externalizing behaviors (Campbell, March, Pierce, Ewing, & Szumowski, 1991; Campbell, Pierce, March, Ewing, & Szumowski, 1994). Correspondingly, in one study, 71% of those labeled chronic juvenile offenders had gone through the early onset trajectory (Patterson, Forgatch, Yoerger, & Stoolmiller, 1998). By the time these children have reached second or third grade, teachers and peers have begun to see them as problematic and potentially dangerous (Patterson, 2008). Children on this path are at risk of continuing on a trajectory toward numerous problems as adolescents, including peer rejection,

delinquency and early arrest, school dropout, interpersonal violence, substance use and internalizing problems (Moffitt, 1993; Moffitt, Caspi, Harrington, & Milne, 2002; Patterson & Yoerger, 2002). Left untreated, as many as 50 to 75% of these children will continue to exhibit severe conduct problems and antisocial behavior in adolescence (Nixon, 2002). Compared to individuals on the “late onset” or “adolescent limited” trajectory, who typically engage in covert types of antisocial behavior (e.g. stealing, lying and relational aggression) during adolescence and desist in young adulthood (Dishion & Patterson, 2006), early starters will commit more serious and violent offences (overt) as adults, have more substance use problems, have more mental health problems and engage in more domestic violence against women and children (Fergusson, John Horwood, & Ridder, 2005; Moffitt, 2006). Moreover, individuals on this high risk path are, in contrast to late starters, likely to be involved in overt conduct problems as children and, in resemblance with late starters, covert conduct problems in adolescence. The fact that early onset individuals are joined by late onset individuals in performing antisocial and criminal behavior during adolescence is reflected in what has been referred to as the age-crime-curve (Dishion & Patterson, 2006; Moffitt, 1993). Generally, there is a growth in antisocial behavior during adolescence, which peaks somewhere between the age of 16 to 18 years. Based on the age-crime-curve, Moffitt (1993) hypothesized that childhood onset conduct problems would be more correlated with adult antisocial behavior than adolescence onset conduct problems. Early onset individuals, who are assumed to be the same people that engage in antisocial behavior as adults, are joined by late onset individuals in adolescence, and these individuals are more likely to desist before reaching adulthood, therefore making predictions based on reports from adolescence less reliable (Moffitt et al., 2002; Moffitt, 2006).

As suggested by the above findings, there is now ample evidence of a high risk group of individuals who are on a persistent path of conduct problems and antisocial behavior.

Although labeled differently by researchers, this group of individuals has consistently been detected in longitudinal studies. Thus, Tremblay et al. (2004) found evidence of a “high physical aggression” group, Brame, Nagin and Tremblay (2001) detected a “high chronic aggressive” group, whereas Wiesner and Capaldi (2003) identified a “chronic high-level” group and Moffitt (e.g. 2006) documented a “high-persistent” group of individuals.

## **1.2 The origins of conduct problems**

### **1.2.1 The interaction of prenatal/perinatal risk factors and the environment**

According to the theory put forward by Moffitt and colleagues, life-course persistent antisocial behavior originates from prenatal and perinatal risk factors (inherited or acquired) that impair the functioning of the child’s central nervous system (neuropsychological variation), which are manifested early in the child’s life as cognitive deficits, neurological abnormality, undercontrolled temperament, attention problems, hyperactivity and delayed motor development (Moffitt, 1993; Moffitt et al., 2002). Prenatal risk factors include parental malnutrition, maternal health status and substance use. Also, perinatal complications have been found, in conjunction with family adversity, to predict early onset antisocial behavior (Beck & Shaw, 2005). According to the theory, both individual risk factors and social factors (e.g. parental neglect of child, inconsistent and harsh discipline) are necessary prerequisites for life-course persistent antisocial behavior. More specifically, the antisocial path is assumed to become persistent due to early difficult child behavior originating in neuropsychological vulnerabilities that provoke negative behavior (e.g. harsh treatment and rejection) from parents and, later in the development, teachers and peers (Moffitt, 2006). Therefore, the theory implicates child temperamental characteristics as a necessary (and proximal), but not sufficient feature for the development of persistent conduct problems. This suggestion has

gained support from other studies (Lacourse et al., 2006; Shaw, Owens, Giovannelli, & Winslow, 2001).

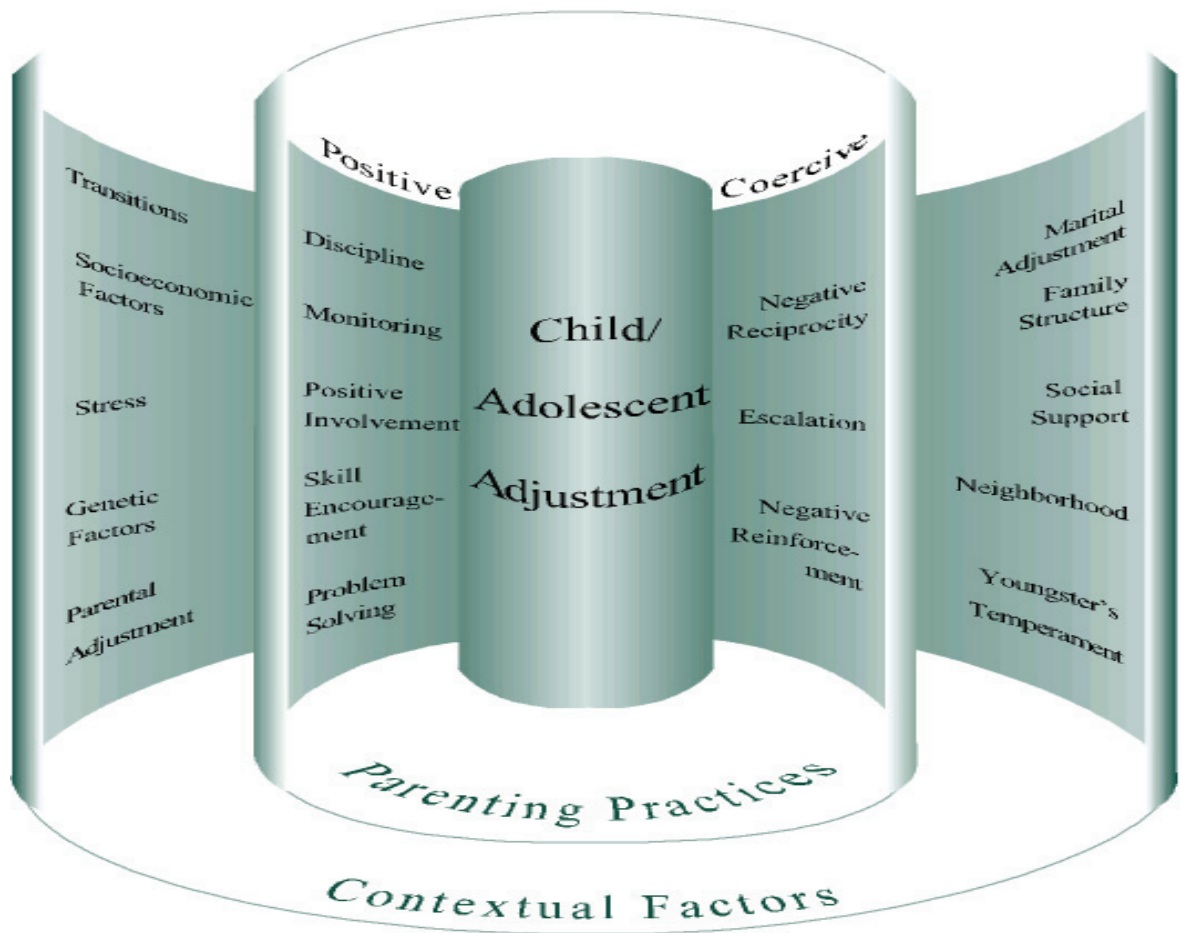


Figure 1. Figure from Forgatch & Martinez (1999) displaying the relationship between contextual factors and parenting practices. Used with permission from the 1<sup>st</sup> author.

The social interaction learning (SIL) model is an influential model put forward by Patterson (1982). This is a transactional model that views individuals and contexts as dynamic



systems that change over time (Sameroff & MacKenzie, 2003). The model addresses the development of conduct problems and highlights the importance of relationships and interactions between family members and peers (Forgatch & Martinez, 1999; Patterson, 1982). The SIL model, which has a stronger focus on micro-social processes leading to persistent antisocial behavior than Moffitt's theory, holds that contextual factors (including, but not limited to child neuropsychological factors) initiate coercive interactions between family members by disturbing parenting skills, thereby leading to an early onset path of antisocial behavior (see Figure 1). Generally, the model asserts that contextual factors hold the answer to why disturbed parenting practices emerge in the first place and addresses how these factors influence conduct problems indirectly through parenting (Patterson, 2008). So, while Moffitt's theory state that child neuropsychological factors are prerequisites for early onset conduct problems, the SIL model posits that other contextual risk factors (e.g. maternal depression, family size, SES interparental conflict, child temperament, divorce, economic conditions and unemployment) also may initiate an early onset trajectory of conduct problems through their influence on parenting practices. Within this model, parenting practices and parent-child interactions have been suggested to have a proximal and causal influence on child conduct problems (Forgatch & Martinez, 1999). As stated by Dishion and Patterson (2006, pp. 512): "...relationships define the proximal environment in which change and development transpire".

### **1.2.2 Parent-child interactions and parenting practices**

"Rage and anger are some of the most salient features of the coercive children. As family despot, they control the family and all its members. The angry frown and frequent explosions suggest that reign is not a happy one" (Patterson, 2002, pp. 39). As noted, the SIL model postulates that parent-child interactions and parenting practices have a primary and

proximal causal effect on the early development of antisocial behavior. According to the model, aggressive and aversive behaviors occur if they are functional in ending other family member's (e.g. parents and siblings) attempts to change or control the individual's behavior (Patterson, 1982; Snyder & Stoolmiller, 2002). Moreover, coercive cycles of family interactions are supposed to be initiated when children are reinforced for aggressive behavior. For instance, a child who initiates a temper tantrum (i.e. coercive act) to get ice-cream instead of dinner until the parents resign (i.e. escape conditioning), learns that performing aggressive behavior is functional. Note that neither the child nor the parents are passive participants in these interactions. Parents contribute by resigning and the child contributes by acting out. In families with an antisocial child, aggressive and coercive behaviors (e.g. yelling, hitting and psychological assault) often provide the most effective strategy to "win" conflicts and therefore become a frequent part of family life (Snyder & Patterson, 1995). Consistent with this view, Dishion and Patterson (2006) have reported that in such families, aversive events take place as often as every 3 minutes and conflicts as often as every 16 minutes! As time goes, bidirectional coercive interactions in the parent-child dyads become habitual and the child learns that aversive behaviors are functional, whereas socially competent behaviors are not (Forgatch & Martinez, 1999). Children in these families are therefore doubly handicapped by learning skills of coercion, but not the skills of social competence. Within this perspective, the family can be seen as a social and behavioral training camp for children, and it is within this arena children are trained to make use of aggression and coercion. Shaw et al. (2001) have shown that this training process begins already when children are toddlers, and parent-child conflict has been found to be a particularly strong predictor for early onset conduct problems (Ingoldsby et al., 2006). From a transactional perspective (Sameroff & MacKenzie, 2003), early and frequent conflicts between parents and children that begin during toddlerhood set the stage for later coercive exchanges that become an integrated part of the

parent-child relationship. Three types of family coercion have received particular attention within the SIL model: Negative reciprocity, escalation and negative reinforcement.

Negative reinforcement means that a person responds in kind to a negative request (e.g. child yells at mother and mother yells back). When these kinds of behavioral patterns have become stable, they indicate distress in families (Patterson, 1982). Escalation, which is another type of coercion, refers to interactions where family member's negative responses increase in intensity until one person "wins" the conflict bout through the use of an aversive behavior (e.g. humiliation, hitting and temper tantrum). Observational studies have found escalation to be more pronounced and dominant in "aggressive" families as compared to "non-aggressive" families (see Snyder & Stoolmiller, 2002 for an overview). Negative reinforcement underlies both reciprocity and escalation. The abovementioned child, who initiated a temper tantrum to get ice-cream, exemplifies this type of coercion. Since the parents let the child have ice-cream, the child was negatively reinforced for his/her behavior. The parents contributed to this by backing off, which reflects escape conditioning. Avoidance conditioning comes into play when the parents are shaped to stop asking the child to eat dinner or to immediately back off for the child's demands in order to prevent temper tantrums. Patterson (1982) stated that parents who terminate conflicts by escape and avoidance strategies achieve short-term goals at the expense of long-term gains in misery. According to the SIL model, these parent-child interactions constitute the most proximal foundation for persistent conduct problems. Parenting practices, which are at the next level of proximity and constitute parent's contribution to family coercion, are easier to study than parent-child interactions (Patterson, 2008).

Parenting practices have been found to positively influence child adjustment (Bor, Sanders, & Markie-Dadds, 2002; DeGarmo, Patterson, & Forgatch, 2004; Patterson, Chamberlain, & Reid, 1982; Reid, Webster-Stratton, & Baydar, 2004). Longitudinal and

experimental studies have suggested that discipline (i.e. parents' ability to be authoritative and use appropriate strategies to control child behavior), monitoring (i.e. parental tracking of children's whereabouts), positive involvement (i.e. parental ability to interact empathically and warmly with the child), skill encouragement (i.e. parental ability to promote competence) and problem solving (i.e. parental ability to interact in a constructive manner when problems arise) appear to be central dimensions of parenting (Forgatch & Martinez, 1999).

It is worth noting, however, that while these parenting constructs are well-established within the SIL model; different constructs have been used and validated in other studies. Furthermore, the literature has suggested that no single dimension of parenting can provide a complete explanation of child adjustment (Cummings, Davies, & Campbell, 2000). In order to account for the multi-dimensionality of parenting, studies should assess several dimensions of parenting.

### **1.2.3 Effects of contextual factors on parenting skills**

As illustrated in figure 1, the SIL model holds that contexts are assumed to impact child adjustment indirectly or distally through their influence on parenting practices (which is considered a proximal factor). In other words, the effects of contextual factors are supposed to be mediated through parenting. See figure 2 for a conceptual model of a mediated relationship. Mediation is commonly tested using strategies originally formulated by Baron and Kenny (1986) and more recently by others (Holmbeck, 1997; Shrout & Bolger, 2002). The common assumption in these strategies is that mediation occurs when the relationship between an independent variable and a dependent variable is explained by a third variable.

A number of researchers have acknowledged that risks operate at different levels, and that some are considered proximal and distal (Wasserman & Seracini, 2001). (Later in this text, when describing interventions, it will become clear that such efforts most often target

proximal risks, rather than distal risks such as unemployment and poverty, which primarily is a concern for social policy makers). The SIL model's mediational hypothesis is also consistent with the spillover hypothesis (Erel & Burman, 1995; Krishnakumar & Buehler, 2000). Within the spillover framework, emotions, moods and behaviors generated in one family subsystem (i.e., couple) are assumed to affect the functioning in another (i.e. parent-child dyad). For instance, stress and tension between parents may preoccupy parental emotional availability and therefore disturb parenting practices (Gerard, Krishnakumar, & Buehler, 2006).

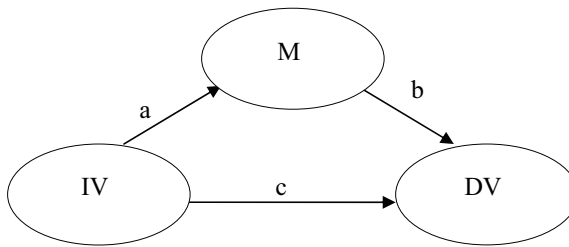


Figure 2. Path model showing a mediated effect. When mediation occurs, the c path (the direct effect) becomes non-significant or drops significantly when path a and b (the mediated effect) are included in the model.

Several studies have documented that early onset conduct problems are related to contextual family risk factors, such as family size, family structure, divorce, parental antisocial history, interparental conflict, teenage single parent, parental psychopathology (e.g. depression and anxiety), socioeconomic factors and changes of primary caretaker (Capaldi, DeGarmo, Patterson, & Forgatch, 2002; Moffitt, 2006; Wasserman & Seracini, 2001). In support of a mediated relationship between contexts and child outcomes, studies have suggested a completely or partially mediated link between interparental conflict and child behavior through parenting behavior (e.g. Buehler, Benson, & Gerard, 2006; Buehler &

Gerard, 2002; Webster-Stratton & Hammond, 1999). The effects of parental stress (Conger, Patterson, & Ge, 1995; Forgatch, Patterson, & Ray, 1996), parental psychopathology (Forgatch & DeGarmo, 1997), socioeconomic factors and family structure transitions (e.g. divorce) (Capaldi & Patterson, 1991; Forgatch & DeGarmo, 1997) on child outcomes have also been found to be mediated by parenting skills. Correspondingly, Forgatch and DeGarmo (2002) found divorce to be related with negative child outcomes only when maternal parenting practices were disrupted. See Capaldi et al. (2002) for an overview of studies supporting the mediated relationship between contexts and child adjustment.

While longitudinal studies do indicate how context, parenting skills and child outcomes are linked, only experimental studies can test the causal status of variables. Experiments have been carried out where families with behavior problematic children have been randomly assigned to parent management training or comparison groups. Findings from such careful investigations have shown improvements in child outcomes among families who received parent training, and these improvements have been found to be mediated through parenting practices (DeGarmo & Forgatch, 2005; Dishion et al., 2008; Dishion & Kavanagh, 2003; Forgatch & DeGarmo, 2002; Forgatch, DeGarmo, & Beldavs, 2005; Ogden & Hagen, 2008). The findings from these studies support the effectiveness of parent management training, as well the theoretical assumptions behind the SIL model, because the designs allowed a manipulation of parenting practices in the treatment groups that produced positive child outcomes. In sum, these experimental studies support the SIL model by indicating that parenting practices are proximal and causal variables for child conduct problems.

#### **1.2.4 The deviant friendship process**

As children continue on a trajectory of antisocial behavior from early childhood to elementary school, problematic behaviors first expressed as temper tantrums, non-compliance

and whining, later transform into behaviors such as bullying, and more covert conduct problems such as lying and stealing. During adolescence, these behaviors may escalate into behaviors such as substance abuse, sexual promiscuity, fraud and robbery (Forgatch & Martinez, 1999). Not only does the behavior of the children change, new predictors are introduced as children grow up. As new social arenas are entered, peers become important socializing agents for deviant and antisocial behavior (Dishion & Patterson, 2006; Moffitt, 2006; Snyder, 2002). Thus, while the SIL model holds that parenting is a causal and proximal variable for child conduct problems, it has also suggested peers to provide a unique, strong, causal and proximal contribution to the development of persistent conduct problems and delinquency (Dishion, Duncan, Eddy, Fagot & Fetrow, 1994; Dishion & Patterson, 2006; Patterson, 2008; Snyder & Stoolmiller, 2002). Correspondingly, Patterson (1993) showed that childhood antisocial behavior was predicted by discipline and monitoring, while, as the children matured, association with deviant peers became an important predictor. This relationship between peers and conduct problems has been labeled the deviant friendship process or deviancy training (Dishion & Patterson, 2006). The causal, or at least the bi-directionally casual, role of peers has been supported in a prevention trial, showing that intervening on playground behaviors leads to substantial reductions in aggression among peers (Stoolmiller, Eddy, & Reid, 2000).

The influence of peers starts early in childhood and accelerates in adolescence (Dishion and Patterson, 2006). Early onset children who have been trained in coercion and aggression, and lack social competence as a result of family socialization, are at risk of being rejected and disliked by a normative peer group as early as preschool (Snyder, 2002). Children are also hypothesized to actively seek out peers that are behaviorally compatible to themselves. In support of this notion, Ingoldsby et al. (2006) found that early starters were more likely to have an antisocial best friend, as compared to other children. Once friendships

are initiated, mutual shaping of behavior repertoires occurs and friends therefore become even more similar over time (Snyder, 2002). Preschool and elementary school settings can therefore amplify processes already initiated in the family, leading to new forms of antisocial behavior. Snyder, Horsch and Childs (1997) found that 50% of aggressive children's mutual friendships were with other aggressive children, as compared to 12% of those children considered less aggressive. Moreover, children with conduct problems seem to get what they give: Not only do they, compared to other children, initiate more unprovoked aggression (both verbal and physical) towards peers, they are also more likely to receive more unprovoked aggression from peers and teachers (see Snyder, 2002 for a review). Interestingly, deviancy training has been found to predict continued and extended antisocial growth among children in the early onset trajectory as well as for late onset (or adolescence limited) antisocial behavior (Patterson & Yoerger, 2002).

### **1.2.5 Gender differences**

Another child risk factor consistently found in the literature is gender (Miner & Clarke-Steward, 2008). In representative samples, boys have received higher ratings of conduct problems (Achenbach, Howell, Quay, & Conners, 1991), and more boys fit into the early onset group, compared to girls (Moffitt, 1993). By one estimate, based on data from a large-scale longitudinal study, boys outnumbered girls by 10:1 (Moffitt & Caspi, 2001). In a study of a Swedish cohort (N = 13,852) the boy to girl ratio was 15:1 for early onset conduct problems (Kratzer & Hodgins, 1999). It has been argued that female conduct problems have been underestimated among girls, since the clinical and diagnostic criteria for identifying children are based on observations of male behaviors, and may therefore be less sensitive to female conduct problems (Zoccolillo, Tremblay, & Vitaro, 1996). However, the lack of prospective and representative research including sufficiently large samples of girls makes it



difficult to draw any reliable conclusions about the nature of girls' developmental trajectories of persistent antisocial behavior (Hipwell & Loeber, 2006). In order to explain the gender difference, Moffitt (2006) has suggested that because girls have lower rates of childhood risk factors, such as neuropsychological dysfunctions, difficult temperament and hyperactivity, they are less likely to provoke negative behavior from parents and, later in the development, teachers and peers. In other words, the interaction between child risk factors and environmental risk factors is assumed to be less likely to occur among girls (Moffitt & Caspi, 2001). Even though girls are outnumbered by boys, Moffitt and others have argued for the existence of an early onset group among girls (Hipwell et al., 2002; Lancot & LeBlanc, 2002). Research investigating the SIL model's applicability to both genders has suggested that the same variables (parent inept discipline, family and peer coercion) predict antisocial behavior among girls and boys (Dishion et al., 1994; Eddy, Leve, & Fagot, 2001). However, others have speculated that the early childhood predictors suggested in the literature are valid for boys only, and that there is a need to develop gender specific models for girls (Keenan, 2001).

#### **1.2.6 Cautionary notes on the SIL model**

The hypothesized mediational relation between contexts and child outcomes are most likely more complex than described here, and this has been taken into account in recent formulations of the SIL model (Dishion & Patterson, 2006; Patterson & Yoerger, 2002). Also, the relation between the contextual factors can be intricate. For instance, a mother who is unemployed may become depressed, and this may disturb her parental skills. In other words, the effect of one contextual factor may be mediated (or moderated) by another contextual variable. Many studies that investigate the mediated influence of a contextual factor include only the factor under study (including Paper I, although it controlled for SES and education),

thereby making it impossible to determine the extent to which the effect derived from the factor itself or from other contextual factors. The study of causal relations among contextual variables is far from completed, and investigators should take this into account in future studies.

There is evidence that once conduct problems have been established, the problems themselves become a predictor of parenting practices. Gerard et al. (2006) found, in a longitudinal study, that not only did parenting predict later child outcomes (externalizing and internalizing behavior), but early child externalizing problems predicted later parent-adolescent conflict. The authors suggested that children contribute to the continuance of destructive family processes through aversive behaviors. Miner and Clarke-Steward (2008) investigated children's trajectories from age 2 to 9 and found that the relation between parenting and externalizing behavior was bidirectional. That is, poor parenting predicted subsequent higher levels of mothers' and teachers' reports of externalizing behavior, whereas mothers' reports of higher levels of externalizing behavior predicted subsequent poor parenting. However, from a pragmatic perspective, the added complexity of a bidirectional relationship does not change the fact that parenting serves as a predictor of externalizing behavior. By definition, a predictor does not need to be the cause of an outcome; it only needs to add information that supports a probabilistic estimate of future events. So, even if parenting was to be both a predictor for, and an outcome of conduct problems, it would still be relevant to address parenting practices in interventions, since both longitudinal and experimental studies have shown that change in parenting predicts change in child outcomes. A similar pragmatic inference can be made about Moffitt's hypothesis that both prenatal/perinatal risk factors (inherited or acquired) and poor parenting practices are necessary, but not sufficient, prerequisites for early onset conduct problems. If both features have to be in place in order to

initiate an early onset antisocial trajectory, then it should be sufficient to address parenting skills.

Coercive behavior patterns with parents or peers do not operate separately or independently of each other, and it is important to address the joint influence of parents and peers at different developmental stages (Dishion & Patterson, 2006). As described above, findings have shown that children who start early and persist with problematic behaviors are trained in the family to engage in conduct problems, and when entering school they move on to be trained by deviant peers. This view underscores how parenting practices influence later peer deviancy training. However, there is evidence that when children enter school and especially when reaching adolescence, deviancy training can influence parenting practices. In a study comparing early starters and children not exhibiting conduct problems, findings indicated that, as the boys grew from 9 to 18 years of age, the parenting practices deteriorated for the early starter group, while staying stable in the other group (Dishion, Nelson, & Bullock, 2004). The investigators found that deviant friendship processes predicted lower parental monitoring. Furthermore, the interaction of parenting practices and deviant friendship (boys who had disengaged parents and who selected deviant peers) predicted who were highly antisocial at age 26. In an experimental study of the effects of parent management training for divorced mothers, the control group that did not receive the intervention showed a similar decline in parenting practices (Forgatch & DeGarmo, 2002). Such findings highlight how family factors are intervened with peer influences, and that the joint effect of family and peers contributes to explain life-course persistent antisocial behavior.

### **1.3 Rationale and empirical foundation of theory driven interventions**

“If you wish to change the child, you must systematically alter the environment in which he or she lives” (Patterson, Reid, & Eddy, 2002, pp. 21). Early trajectories of conduct

problems can be altered, as suggested by reviews and meta-analyses of preventive and clinical intervention studies (Brestan & Eyberg, 1998; Lundahl, Risser, & Lovejoy, 2006; Nixon, 2002). Therefore, the development of interventions targeting children with moderate to severe conduct problems at an early stage has been an important area of research in the last decades (e.g. Webster-Stratton, Reid, & Hammond, 2004). The earlier an intervention is initiated in a dysfunctional process, the greater impact it generates in terms of preventing diffusion of negative effects to other arenas (e.g. from the home to the school) (Forgatch & Martinez, 1999). Preventive efforts aimed at young children have been prioritized because of the apparent benefits of hampering the development of problems before they become severe, pervasive and stable (Dishion et al., 2008). In other words, in preventive efforts, individuals at risk are identified and targeted before having developed severe conduct problems (Gardner, Dishion, Shaw, Burton, & Supplee, 2007). Although trajectories of antisocial behavior can be prevented and altered through intervention, findings have indicated that about one third of those parents who received parent management interventions for child conduct problems still exhibited social, peer relational and academic problems 2-3 years later (Webster-Stratton et al., 2004). This finding emphasize the need for continued efforts to develop better and more refined interventions in order to help as many families and children as possible.

Both basic and applied research, which mainly has been quantitative and conducted in the US, has contributed to the development of the interventions described below. The scientific process of developing the SIL model has generated basic research findings about the development of child conduct problems, as well as practical applications for interventions. Basic research has informed applied (intervention) research about which dysfunctional processes to target. Intervention research has, by addressing these processes, tested the hypotheses derived from basic research. In other words, basic and applied research has been

linked. Interventions based on the theoretical assumptions described above will be addressed in the following sections.

### **1.3.1 Parent management training interventions**

Parent management training – the Oregon model (PMTO) builds on principles derived from the SIL model. As described above, the model highlights the importance of coercive family interactions. Child behavior is presumed to be directly related to parenting practices. Coercion and aggression are often habitual in families with a behavior problematic child, and children's prosocial behaviors are often ignored. The aim of PMTO is to alter these behavioral patterns by replacing negative interactions and coercion with effective parenting practices. Consequently, parents learn how to use mild forms of negative consequences (i.e. removal of privilege or time out) for deviant behaviors and rule breaking. Furthermore, since prosocial behaviors tend to be lacking in families with a behavior problematic child, another objective of PMTO is to increase parent's positive interactions with their children by using positive teaching strategies.

PMTO is a manually-based treatment (Askeland, Christiansen, & Solholm, 2005; Forgatch, 1994) intended for parents with children aged 4 to 12 years who have developed severe, stable and pervasive conduct problems. Parents are the primary targets of the intervention, and throughout the treatment they are trained in five basic skills which are the core components of PMTO: discipline, encouragement, positive involvement, monitoring and problem solving (Forgatch & Martinez, 1999). Although manually based, PMTO is adapted to the needs and strengths in each family (Solholm, Askeland, Christiansen, & Duckert, 2005). PMTO has a limited duration, usually lasting 20 hours, with weekly meetings between the parents and the interventionist.

Quite a number of studies have investigated the effectiveness of PMTO interventions, and the treatment principles have been tailored to a variety of clinical and preventive populations (Forgatch & Martinez, 1999). In an early clinical randomized controlled trial (RCT), Patterson, Chamberlain and Reid (1982) found that children who received PMTO reduced their deviancy substantially compared to children in the control group. Ogden and Hagen (2008) showed, in a randomized trial of PMTO in Norway, that the treatment effects related to child compliance, observed child-initiated negative interactions and child externalizing behavior were indirectly affected through improved discipline. In a sample (N=238) of recently separated mothers (prevention efficacy trial), outcomes showed that PMTO had an effect on non-compliance (Martinez & Forgatch, 2001). In follow-up studies with the same sample, PMTO had effects on school performance (Forgatch & DeGarmo, 2002), externalizing and internalizing behavior (DeGarmo, Patterson, & Forgatch, 2004) and delinquency 3 years after the intervention (DeGarmo & Forgatch, 2005). Nine years after the PMTO intervention, teacher reports of delinquency and official court records of police arrests were significantly reduced in the PMTO group compared the control group (Forgatch, Patterson, DeGarmo & Beldavs, in press). In support of the SIL model, parenting practices were found to mediate the child outcome effects.

Other research teams have studied the effectiveness of parent training interventions largely built on the same principles as PMTO. For instance, “The Incredible Years” is a program consisting of multiple interventions delivered to parents, teachers and children, designed to prevent, reduce and treat conduct problems in young children. “The Incredible Years” provides interventions for at-risk children in the age range 3-8 years.

Webster-Stratton and colleagues have, in clinical RCTs, investigated the effects of parent training treatment delivered to children with early onset conduct problems. Immediately after treatment, parent training was found to improve parenting practices, and to

reduce child negative behaviors at home, compared to a control group (Webster-Stratton, 1994; Webster-Stratton et al., 2004). Preventive interventions based on the Incredible Years parent training procedures have been successfully delivered to low income preschool children and toddlers (Gross et al., 2003; Webster-Stratton, 1998). Findings indicated that the program had immediate positive effects on parenting practices, child conduct problems and social competence. A recent RCT investigated the effect of this intervention on children with the combined risk of living in poverty and having an older delinquent sibling (Brotman et al., 2008). Findings showed immediate effects on child physical aggression and sustained effects on parenting practices. Furthermore, a randomized study of a brief parent training intervention, carried out with a sample of 120 low-income 2-year-old boys and their families, showed that the intervention had positive effects on parenting skills (Gardner et al., 2007) and child destructive behaviors (Shaw, Dishion, Supplee, Gardner, & Arnds, 2006).

Finally, in a recent meta-analysis, parent management training was reported to be a robust intervention for children with conduct problems (Lundahl et al., 2006). The authors reported moderate effect sizes immediately after treatment and small effect sizes for follow-up outcomes. Based on these findings, the investigators suggested that, although the immediate outcomes provide support for parent training interventions, the attenuation of follow-up effects indicate that the sustainability of parent and child outcomes may be best secured by continuing-care models which help parents maintain their skills and adjust them to the children's developmental changes.

Parent counseling and Parent management group training are two recently developed preventive parenting training interventions in the Norwegian community-wide model called Early Intervention for Children at Risk for Developing Behavioral Problems (EICR) (see Christiansen, 2006; Paper II). The intent behind the Parent counseling and Parent management group training is to provide effective and empowering counseling to parents with

one or more children with moderate risk of severe and persistent conduct problems. The interventions are based on the PMTO components and involve guiding and training of parents in how to use effective parenting skills like good directions, encouragement, negative consequences and problem solving in order to prevent and reduce child problem behavior. Parent counseling is short-term, lasting for 3-5 weeks, with weekly meetings between the interventionist and the parents, while the Parent management group training intervention lasts for 12 sessions through weekly meetings between the groups of parents (N = 5-8) and the interventionist. RCTs of these interventions are currently being carried out.

### **1.3.2 Teacher interventions**

Despite the empirical support for parent training interventions, they appear to have some weaknesses. Although findings have shown that parent training interventions result in child improvements at home with parents, they do not always offer the same improvements at school and with peers. In other words, the effects of parent training interventions do not necessarily generalize from one setting to the other (Ogden & Hagen, 2008; Taylor & Biglan, 1998). Also, behavior problematic children have been found to often interact coercively with teachers, to receive less support and teaching, and more criticism in the school context (Snyder, 2002). Teachers', as well as parental coercive interactions (negativity and inconsistency) with children have been considered proximal predictors of the development of conduct problems (Hawkins, Catalano, & Miller, 1992).

Thus, interventions building on many of the same principles as parent management training have been applied to teachers (Webster-Stratton et al., 2004). For instance, the teacher training intervention in the "Incredible Years" program is delivered to teachers. This intervention targets teacher-parent collaboration, classroom management strategies for handling conduct problems and to increase social competence and strategies to promote



positive interactions with behavior problematic children. Teachers learn how to prevent peer rejection among behavior problematic children by teaching them problem solving strategies and collaboration, as well as helping peers respond adequately to aggressive behaviors. Findings from a clinical RCT showed that additive treatment effects were obtained on teacher behavior management and on reports of behavior problems when combining teacher and parent training as compared to parent training alone (Webster-Stratton et al., 2004). Correspondingly, universal (i.e. interventions that do not distinguish between student's risk levels) preventive teacher training programs interventions have, in a review of the literature, been considered promising since they have been found to increase children's social skills and reduce misbehavior (Terzian & Fraser, 2005).

Based on the above knowledge, one of the EICR interventions is intended to help teachers and preschool staff interact competently with behavior problematic children (in the selected or indicated group) and to establish predictable classroom settings for these children in order to reduce their problem behaviors. The intervention involves individual consultation with teachers and preschool teachers struggling with behavior problematic children. The teachers are trained and guided by consultants in how to give good directions, create common rules, encourage positive behavior and to effectively apply negative consequences and problem solving. This is a short-term intervention, lasting on average 8 weeks, with weekly meetings between the consultant and the school or pre-school teacher.

### **1.3.3 Child training interventions**

As already noted, the effects of parent training interventions do not necessarily diffuse to other settings. Furthermore, as suggested by Webster-Stratton, Reid and Hammond (2001, 2004), child interventions are important when parents can or will not participate in parent management training due to contextual factors such as life stress, work conflicts, family

issues, interpersonal issues and parental psychopathology. Furthermore, children with conduct problems are at risk of being rejected and disliked by a normative peer group as early as preschool and have also been found to actively select peers that are behaviorally compatible to themselves (Dishion & Patterson, 2006; Snyder, 2002). This deviancy training process will contribute to the ongoing development of conduct problems. In order to counteract these processes, interventions that directly teach children social skills (i.e. play, friendship and conversational skills), cognitive processes (i.e. problem solving, self-control and anger management) and emotional processes (i.e. empathy training, perspective taking) have been developed.

A clinical RCT, with a sample of children with early onset conduct problems, showed that children who received The Incredible Years child training had significantly fewer parent reported externalizing problems, and less teacher reported aggression, immediately after treatment. At follow-up one year later, most treatment effects were maintained (Webster-Stratton et al., 2001). In a more recent study the same authors found that child training had a significant effect on children's social competence, and the effects of child training generalized across settings (Webster-Stratton et al., 2004). Child training resulted in reduced maternal harsh and negative parenting, and reductions of child negative behaviors at home and in school compared to the control group. Similarly, Kazdin, Siegel and Bass (1992) conducted a clinical RCT comparing a child training intervention and a parent management training intervention and found them to be similar on outcome measures (e.g. aggression, antisocial behavior, prosocial competence) across settings (home, school and in the community) at post-treatment. The effects of child training were to a larger degree maintained at follow up one year later, as compared to parent management training. Despite these promising findings, two meta-analytic reviews have found small long term effects of social skills training interventions (Gresham, 1998; Losel & Beelmann, 2003).

One of the EICR interventions, Social skills training, directs teaching at-risk children in preschools and schools in order to increase their social skills and reduce their problem behavior. The children are individually trained and coached by social skills trainers in emotion regulation, problem solving skills and anger management skills. The principles for this module are derived from PMTO and Stop Now and Plan (SNAP™). SNAP™ is a cognitive behavioral strategy developed by the Child Development Institute (SNAP™ Children's group manual, 2001). This is a short-term intervention, lasting in average for 8 sessions. An RCT of the parent counseling intervention is currently being carried out.

#### **1.3.4 Should interventions be combined?**

The moderate effects of single interventions (parent, child or teacher) may suggest that programs should be combined and applied in multiple risk areas (Losel & Beelmann, 2003; Taylor & Biglan, 1998). Kazdin, Siegel and Bass (1992) found that the combination of parent management training and child training was more effective than either treatment alone. Similarly, Webster-Stratton and Hammond (1997) found that the combination of parent training and child training produced better outcomes on child outcomes at 1 year follow-up. In a more recent study, although child training and parent training fared better than the authors expected in the school context, they concluded that combining parent training with child -or teacher training is the most beneficial approaches for treating children with pervasive conduct problems (Webster-Stratton et al., 2004). Correspondingly, Dishion et al. (1994) suggested that interventions should be applied across settings (home and school). They argued that, even though coercion learned and practiced in the home may be similar to the coercive behaviors at school, the alteration of such behaviors at home will not necessarily reduce conduct problems in the school context. Such findings have led scholars to suggest strategies where interventions are combined based on the differing needs of children, both with regard to the

degree of child problems and the contexts where the problems are present (Webster-Stratton, Reid & Hammond, 2004). For instance, for a child experiencing problems at home only, parent management training would be the key treatment condition. Child training and teacher training would be important additional components if the child is experiencing peer difficulties and exhibits problem behaviors in the classroom.

Based on such findings and recommendations, the EICR-model has the dual goal of preventing and treating conduct problems among pre-adolescent children. The EICR-model uses a strategy in which interventions are offered and combined based on differing needs of children, parents and professionals in schools and kindergartens. This model consists of five interventions aimed at different levels of child problem behavior (from moderate to severe) in multiple settings (homes, schools and kindergartens). For example, a child who displays problem behavior both at home and in school would be offered interventions in both arenas.

### **1.3.5 The need for implementation strategies**

Biglan (1995) has argued that the research on variables that influence conduct problems and antisocial behavior has generated enough knowledge to turn the energy towards research reducing the prevalence (i.e. the proportion of individuals) and incidence (i.e. the frequency) of conduct problems on a population level. In other words, Biglan recommends that the focus should not entirely be on refining interventions. Instead, efforts should be made to implement evidence based practice in real world settings. A reduction of conduct problems in a population necessitates the implementation of effective intervention strategies at the community level, since such strategies enhance the diffusion and availability of effective efforts (Biglan, Metzler, & Ary, 1994; Dean, Myors, & Evans, 2003; Sanders, 2003). It has been suggested that implementing preventive community-wide efforts addressing multiple risk and protective factors in children, families and communities (e.g. school settings) is a

productive strategy (Hawkins, Catalano, & Arthur, 2002; Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Middlemiss, 2005). Two promising examples of community-wide models developed to provide effective interventions are the “Communities That Care” (CTC-model; Hawkins et al., 2002) and the “Every Family” (EF-model; Sanders, Ralph, Thompson, Safronoff, & Gardiner, 2005). These models include an integrated system of various intervention modules (i.e. multi-modular or multi-component) adjusted to the needs of the target group (i.e. multi-level) that are successively implemented across social settings (i.e. multi-systemic).

Similarly, the EICR model reflects the notion that evidence-based and tailored interventions should be implemented at the community level to address conduct problems and target the main social arenas where the problem behavior is evident (e.g. home, kindergarten or school) (Biglan et al., 1994; Rutter, Giller, & Hagell, 1998). The EICR-model represents a continuum of intervention components that enable the implementing agents (i.e. the municipality) to offer interventions based on the needs (e.g., indicated) of target groups.

### **1.3.6 Interventions and gender differences in child outcomes**

Unfortunately, most intervention studies have focused solely on boys, and few have included sufficient numbers of girls to report gender specific outcomes (see Table 1). Some investigators have argued that interventions aimed at reducing conduct problems should be tailored to the specific needs of girls. The Earls court Girl Connection intervention is a multi-systemic intervention program developed for girls aged 5-11 years with conduct problems (Pepler, Walsh, & Levene, 2004). The development of this intervention was based on preliminary trends suggesting that interventions who did not take gender in to account produced negative outcomes for girls. Treatment effects of this intervention have been reported to vary from moderate (for reductions of conduct problems) to large (for

improvements of positive behaviors) (Pepler, Walsh, & Levene, 2004; Walsh, Pepler, & Levene, 2002). Others have found interventions aimed at children with conduct problems to be about equally effective for boys and girls (Beauchaine, Webster-Stratton, & Reid, 2005; Kazdin & Crowley, 1997; Webster-Stratton, 1996). In a study combining data from 6 RCTs and 514 children (112 girls) aged 3-8 years enrolled in the Incredible Years programs, the authors found neither gender nor age to moderate intervention outcomes (Beauchaine et al., 2005). The upper age limit for children in this study was 8 years and it does not clarify whether these results are applicable to children from 9 to 12 of age. Ogden and Amlund-Hagen (2008) found a gender x treatment effect indicating that girls benefited more in terms of social competence than boys. There were, however, none significant gender differences on the other treatment outcome variables in this study of children aged 4-12. But as in previous RCTs, the proportion of girls was low in this study (20%). In sum, a number of findings indicate that parenting programs aimed at children with conduct problems are equally effective for girls as for boys at least up to the age of 8 years.

Table 1. Intervention studies reporting girl specific outcomes  
(Hipwell & Loeber, 2006)

	Pre-adolescent	Adolescent
Girls only	1	3
Mixed sample	2	5

## **1.4 Aims of the present thesis**

The present thesis had the dual goal of contributing to 1) the understanding of processes leading to conduct problems and 2) the development of effective interventions for children with moderate to severe conduct problems. Specifically, the study goals were to:

1) Investigate processes leading to conduct problems.

In order to study processes leading to conduct problems, the hypothesis that the effect of interparental collaboration was mediated through maternal and paternal parenting was tested in a clinical sample of 136 families with a child aged 4-12 years in Paper I. Also, the role of the parents' gender was examined.

2) Explore interventions for children with conduct problems

To explore the applicability of interventions, two studies were carried out. The study presented in Paper II explored whether the implementation of a set of interventions (EICR) in a community was related to reduced problems behaviors and in the school context. The study presented in Paper III tested whether girls changed differently in treatment outcomes following PMTO as compared to boys.

## **2 Materials**

### **2.1 Samples and procedures**

All studies followed the standards of The Norwegian National Committee for Research Ethics, and the Norwegian Social Science Data Registry. Statistical analyses were conducted on anonymous data.

### 2.1.1 Sample in Paper I

The cross-sectional findings presented in Paper I are based on two interconnected clinical studies of PMTO. Families who had been in contact with child and adolescent psychiatric services to get help with their child's conduct problems were participating prior to receiving intervention. The sample represented all health regions in Norway, and as the study goal was to get as close to a real-life sample as possible, inclusion was based on clinical judgments rather than screening procedures. Of the 301 families who had agreed to participate, 136 complied with the following admission criteria: 1) two-parent families that 2) had completed the questionnaires and were videotaped solving structured family interaction tasks (SIT). The children (102 boys, 75%) ranged from 4 to 12 years of age ( $M = 8.26$ ,  $SD = 2.18$ ).

In 131 (96.3%) families, the target children lived with the biological mother, in two (1.5%) families, the children lived with stepmothers and the biological father, and three (2.2%) lived with their foster mothers. Three families consisted of foster parents. Among the male caretakers, 99 (72.8%) were the child's biological father, 32 (23.5%) were step-fathers living with the biological mother, and the remaining three (2.2%) were foster fathers. The mean age of the primary caregivers was 36.43 years ( $SD = 5.76$ ). Age was not obtained from the other parent. The average gross annual family income was NOK 514.192 ( $SD = 205.471$ ), about \$95.081 ( $SD = 38.050$ ). Thirty-six (29%) parents ( $N=124$ ) had a college or higher university degree, 61 (49%) had finished high school and 27 (22%) had completed junior high school or elementary school. Information about ethnic background was reported by 41 respondents, and 39 (95%) of these were Norwegian, 1 reported "White/Danish" and 1 reported "White/other".



### **2.1.2 Sample in Paper II**

The study was carried out in a Norwegian suburban municipality with a population of 31,000 persons in 2005. The participants, who comprised school employees from the seven elementary schools (1st–7th grade) in the municipality, were recruited from a pool of 271 employees working no less than half-time. At the first assessment 266 of 271 (98%) participants filled out the questionnaire. The participants' age ranged from 20 to 65 years ( $M = 43$ ,  $SD = 11$ ), on average they had 11 years of experience (ranging from 0 to 39 years) and 233 (88%) were females. With regard to education, 102 (38%) had formal teacher training, 48 (18%) had other types of higher education, 42 (16%) were educated as pre-school teachers, 28 (11%) had a university degree, and 39 (15%) had no formal training. One hundred and sixty (61%) were full-time employees, 191 (72%) worked as teachers and 64 worked as teacher's assistants (24%). Employment status was missing for 11 participants (4%). Forty-eight percent ( $N = 128$ ) of the participants worked in the three schools in the intervention area, and 57% ( $N = 138$ ) worked in the four schools in the comparison area.

### **2.1.3 Sample in Paper III**

As for Paper I, this study was part of two interconnected studies on PMTO. Participants were 323 families who received PMTO, and 239 (74%) participated in assessment sessions before (pre) and after (post) treatment. The families had at least one child between 4 and 12 years of age. The mean age of the target children was 8.68 ( $SD = 2.14$ ), and of these 236 (73.1%) were boys. The families who were recruited had been in contact with child and adolescent psychiatric services to get help with their child's behavioral problems, and were recruited using the agencies' regular referral procedures. The sample represented all health regions in Norway. Since the study goal was to get as close to a real-life sample as

possible, inclusion in the study was based on clinical judgments rather than screening procedures.

The average age of the reporting parent was 37.69 years ( $SD = 6.30$ ). The average gross annual family income was NOK 415.440 ( $SD = 222.510$ ), i.e. about \$69.240. Hundred-and-twenty-seven (of  $N = 301$ , 42.2%) parents reported that the child lived with both biological parents, 113 of 301 (37.5%) were single parent households (divorced, separated or never married) and 61 (20.3%) were married or cohabiting with a different adult than the children's biological father. Ninety-one (of  $N = 305$ , 29.9%) of the parents reported having a college or higher university degree, 159 (52.2%) reported having finished high school and 55 (18%) reported having completed junior high school or elementary school. Ethnical background was reported by 266 respondents and 250 (94%) of these were Norwegian.

## **2.2 Measures**

In the papers presented in this thesis, all instruments had been translated and used in previous Norwegian studies (e.g. Ogden & Hagen, 2008; Sorlie & Ogden, 2007).

### **2.2.1 Measures applied in Paper I**

Paper I included an independent latent variable labeled interparental collaboration. This construct consisted of three observed variables: interparental task collaboration, verbal collaboration and interparental consensus. The two former scales were developed specifically for use in the present study and derived from the questionnaire "Coder's Impressions" (CI) of the structured interaction task (SIT), which is a procedure intended to elicit the family interactions of interest. Task collaboration included four items for older children and eight items for younger children (e.g. "Parents worked together as a team when evaluating their

effort”). Cronbach’s alphas for older and younger children were .88 and .90, respectively. Verbal collaboration included three items for both older and younger children (e.g. “Parents interfered when evaluating their effort”). Cronbach’s alpha was .86. The consensus measure is a 13-item sub-scale in a Likert-scale format, and is a subscale of the Dyadic Adjustment Scale (Spanier, 1976), which has demonstrated acceptable reliability and validity in previous studies (Spanier, 1976; Spanier & Thompson, 1982). The primary caregiver is asked to rate how often the parents agree (ranging from “always agree” to “always disagree”) on issues such as family values (“Aims, goals and things believed important”) and other matters (“Leisure time interests and activities”). The reliability coefficient was  $\alpha = .87$ . The following background variables were included as covariates: family income, parent education and child age.

Paper I included maternal and paternal parenting as mediators. The two latent constructs were represented by the same indicators for mothers and fathers: Discipline, Problem solving and Positive involvement. Items were rated on a 5-point Likert-scale, in which higher scores indicate greater parenting skills. Discipline included the same 13 items for both older and younger children (e.g. “Mother’s/Father’s discipline style is consistent, even-handed and firm when necessary”). Cronbach’s alphas for mothers ( $\alpha = .82$ ) and fathers ( $\alpha = .78$ ) were acceptable. Problem solving included seven items for parents of older children and eight items for parents of younger children (e.g. “Mother/Father explained her/his viewpoint/rationale when appropriate”). Cronbach’s alphas were acceptable both for mothers ( $\alpha = .79$ ) and fathers ( $\alpha = .84$ ) of older children and for mothers ( $\alpha = .81$ ) and fathers ( $\alpha = .79$ ) of younger children. Positive involvement included 32 items for older and 60 for younger children (e.g. “The mother/father was affectionate with the child”). Cronbach’s alphas were acceptable both for mothers ( $\alpha = .96$ ) and fathers ( $\alpha = .97$ ) of older children and for mothers ( $\alpha = .97$ ) and fathers ( $\alpha = .97$ ) of younger children.

Paper I included a latent construct of externalizing behavior as the child outcome. It consisted of three observed variables: non-compliance (2 items for older children and 8 items for younger children), antisocial behavior (3 items for all children) and aggressive behavior (8 items for all children). Non-compliance and antisocial behavior were assessed by coders using the CI. The non-compliance item correlation was .61 for older children and the Cronbach's alpha was .89 for younger children. Antisocial behavior included three Likert-scale items for all children (e.g. "Child demonstrated an antisocial attitude" and "The child acted hostile towards the others") and the Cronbach's alpha was .73. Aggressive behavior was measured using eight items from the Parent Daily Report (Patterson et al., 1982) that specifically targeted aggression (e.g. swearing and hitting), while leaving out other types of problematic behavior (e.g. problems with the police). Parents were asked by phone on three successive days, yes or no, whether specific behaviors had occurred within the last 24 hours. Cronbach's alpha across the three days was acceptable ( $\alpha = .78$ ).

### **2.2.2 Measures applied in Paper II**

Problem behavior in school was assessed with two measures, both rated by school staff. One measure assessed problem behavior incidents in the classroom context, whereas the other assessed problem behavior incidents in other school areas (e.g. playground, hallways, stairs and toilets). Both outcome measures used a 5-point Likert scale, ranging from 1 (not observed) to 5 (observed several times per day). The measures were originally developed by Grey and Sime (1989) and later translated into Norwegian and used in Norway (Ogden, 1998; Sorlie & Ogden, 2007).

The 15-items scale "Teacher rated problem behavior incidents in the school environment last week" had acceptable Cronbach's alphas pre ( $\alpha = .79$ ) and post ( $\alpha = .82$ ). Item examples: "Running in corridors" and "Physical attacks on other students". Two

subscales were constructed from this measure; “Aggressive behavior incidents in the school environment” (9 items, pre  $\alpha = .78$ , post  $\alpha = .80$ ) and “Antisocial incidents in the school environment”. The latter did not reach an acceptable Cronbach’s alphas level, and was thus not used in the analyses.

The scale “Teacher rated problem behavior incidents in the classroom last week” included 20 items and had acceptable Cronbach’s alphas pre internal consistency (pre  $\alpha = .86$ , post  $\alpha = .86$ ). Item examples are “Rude comment or answer to adult” and “Vandalism”. Three subscales were constructed from this measure; “Learning-inhibiting behavior incidents in classroom” (10 items, pre  $\alpha = .83$ , post  $\alpha = .84$ ), “Aggressive behavior incidents in classroom” (pre 4 items,  $\alpha = .70$ , post  $\alpha = .66$ ), and “Antisocial incidents in classroom”. The latter did not reach an acceptable Cronbach’s alphas level, and was thus not used in the analyses.

### **2.2.3 Measures applied in Paper III**

Child Behavior Checklist (CBCL, parent report) and Teacher Report Form (TRF, teacher report) (Achenbach, 1991) are widely used instruments for assessing child adjustment and behavior. Both instruments have been standardized and validated in Norway (Lurie, 2006; Nøvik, 1999). In Paper III, the two instruments were used to assess child externalizing problems and internalizing problems. The scales consist of 3-point Likert-scale items ranging from “0” if the item is never/seldom true for the child, to “1” if the item is sometimes or somewhat true and to “2” if it is often or always true. A high score indicates greater adjustment/behavior problems. Pre and post Cronbach’s alphas were acceptable for both instruments, ranging from .85 to .91.

In Paper III, the parent and teacher version (also includes a child version) of Social Skills Rating System (SSRS) was used (Gresham & Elliott, 1990). The SSRS is a standardized and multi-rater instrument assessing social skills in children and youth, which

has been shown to be both valid and reliable. The scales used in Paper III have been modified from the original instruments, by using a 4-point instead of a 3-point Likert scale (Ogden, 2003; Sørli, Amlund-Hagen, & Ogden, 2008). The SSRS parent scale has 38 items (item example: “Receives criticism well”) and the SSRS teacher scale has 30 items (item example: “Invites others to join activities”). Pre and post Cronbach’s alphas were acceptable for both the parent and teacher instrument, ranging from .87 to .89.

The Parent Daily Report (PDR) has been developed in the US and shown to be a reliable and valid measure of conduct problems (Patterson et al., 1982). The scale was administered by phone to parents on three successive days at pre and post assessment. As previously described, parents were asked, yes or no, whether specific child behaviors had occurred within the last 24 hours. Reliability coefficients were acceptable, with a Cronbach’s alpha of .84 at pre and .86 at post.

In addition, family income based on gross family income, education level and child age was reported by one of the parents and included as a covariate.

The “Teacher Classroom Climate Scale” was used to assess the learning climate in class (14 items, pre  $\alpha = .86$ , post  $\alpha = .87$ ). The scale was developed by Sørli and Ogden (2007). Sample items are: “The students in this class are good friends” and “Some teachers have problems with this class”. A 4-point rating scale ranging from 1 (does not fit) to 4 (fits completely) was used. Two subscales were constructed from this measure “Student relations in classroom” (6 items, pre  $\alpha = .65$ , post  $\alpha = .70$ ) and “Student-staff relations in classroom” (8 items, pre  $\alpha = .82$ , post  $\alpha = .81$ ).

### **3 Statistical methods**

In all papers, analyses were based on questionnaire data. Multiple informants participated and included parent, teacher (and school staff) and observer reports. Statistical analyses were carried out using the SPSS statistical software package 15.0 for Windows (SPSS, 2006) and Mplus 5.0 (Muthén & Muthén, 2008). Means and standard deviations, correlation analyses and reliability analyses were reported.

#### **3.1 Structural equation modeling**

The models in Paper I were tested using structural equation modeling (SEM). SEM provides means for testing theoretical models that incorporate latent (unobserved) and manifest (observed) variables, path analyses and confirmatory factor models within a single analytic framework (Bentler & Chou, 1987; Schumacker & Lomax, 2004). In contrast to traditional statistics, SEM takes measurement error into account when analyzing data by estimating latent constructs, thereby increasing the probability of obtaining estimates that are close to population parameters. In addition to estimating parameters such as path coefficients within the SEM framework, the extent to which a theoretical model fit is supported by data can be determined, and two or more models can be compared in order to verify which one has superior fit. The fit indices are based on calculations of how well a model recaptures the covariance matrix of the data under study. Despite its apparent advantages, SEM does not permit causal conclusions or resolve causal ambiguities. Thorough research designs and theoretical insight and judgment by the researcher is still of paramount importance.

In contrast to conventional statistics (e.g. multiple linear regression), SEM does not have a single statistical test of significance that recognizes a correct model, since other models can provide the same fit indices. In Paper I, the following fit indices were applied: 1) The chi-

square ( $\chi^2$ ) statistics, which calculates the difference between the sample covariance matrix and the fitted matrix (the proposed model). A non-significant chi-square value of zero indicates that a model has perfect fit between the observed sample covariance matrix and the theoretical covariance matrix implied by the specified model. Non-significance as a criterion for accepting a model has been disputed because of the chi-square's sensitivity to sample size; it tends to indicate a significant probability level as sample sizes increase (see Byrne, 2001 for a discussion). 2) The root mean square error of approximation (RMSEA) has been recognized as one of the most informative criteria within SEM. This fit measure is sensitive to the complexity of the model (is parsimony-based), and estimates the degree to which a model fits the population covariance matrix (Byrne, 2001). A small discrepancy gives a good RMSEA fit value. A RMSEA value less than or equal to .05 is considered acceptable (Schumacker & Lomax, 2004), while some statisticians have suggested that values up to .08 can be considered acceptable (e.g. Byrne, 2001). All measures of fit tend to overestimate goodness of fit for small samples (generally smaller than  $N = 200$ ), though RMSEA and CFI are less sensitive to sample size than other fit measures (Fan, Thompson, & Wang, 1999). 3) The comparative fit index (CFI) compares the researcher's model with a null model (also called the independence model) where the latent variables in the model are uncorrelated. CFI compares the covariance matrix predicted by the model set up by the researcher to the observed covariance matrix, and compares the null model with the observed covariance matrix, to estimate the percent of lack of fit which is accounted for by going from the null model to the researcher's SEM model. The CFI varies from 0 to 1, and a value of 1 indicates a very good fit of the model.

Because of the abovementioned advantages, SEM is a suitable tool when testing mediating processes (see figure 2) (Holmbeck, 1997). According to Holmbeck, the first step in testing for mediation is to test the fit of a model, including the independent variable (e.g. interparental collaboration) and the dependent variable (e.g. externalizing behavior). The



second step is to test the fit of the overall model that includes the independent variable, the mediators and the outcome variable. The third step is to establish a significant association between the independent variable (e.g. interparental collaboration) and the mediators (e.g. maternal and paternal parenting) and the mediators and the outcome variable (externalizing behavior) within an overall model (i.e. a model that includes all variables under study). Fourth, the overall model is then tested under two conditions; one where the direct path from interparental collaboration to externalizing behavior is constrained to zero and one where this path is estimated (and thereby unconstrained). By using the goodness-of-fit chi-square values for the constrained and the unconstrained model, one can test whether the difference is non-significant. A non-significant deterioration of the model fit by imposing a zero constraint suggests that mediation occurs.

### **3.2 Bootstrapping**

Recent literature has suggested that tests of indirect effect should be conducted when investigating mediation (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Shrout & Bolger, 2002). Traditional tests of indirect effects use the standard errors of the paths in the model to construct confidence intervals. However, the product of the path from the independent variable to the mediator(s) (path a, see Figure 2) and the path from the mediator to the dependent variable (path b in Figure 2) is not necessarily expected to follow a normal distribution (Cheung & Lau, 2008; Shrout & Bolger, 2002). Bootstrapping, which generates pseudo-samples from the sample with replacements, has been suggested to generate unbiased confidence intervals when the distributions are unknown (Valiente, Lemery-Chalfant, & Reiser, 2007). Therefore, Paper I used the bias-corrected bootstrap method for constructing confidence intervals for the estimates (Cheung & Lau, 2008; MacKinnon, Lockwood, & Williams, 2004). Each pseudo-sample generates an estimate of the indirect effect, and

together they provide a sampling distribution of the estimates. Confidence intervals can be obtained from this sampling distribution. If it includes a zero, the null hypothesis of no indirect effect is accepted.

### **3.3 ANCOVA**

Univariate analysis of covariance (ANCOVA) is a method of analysis of variance (ANOVA) which allows the inclusion of supplementary variables (i.e. covariates) into the model (Tabachnick & Fidell, 2001). This enables the researcher to account (or control) for differences in groups not associated with the independent variable (e.g. treatment) itself. For instance, suppose a researcher wanted to study the effect of a treatment for a disease. In this study, one group of individuals received a treatment of some kind and another group did not receive any treatment at all. The outcome would be related to the purpose of the treatment (e.g. survival or health), and the question of interest would be whether there was a significant difference between the two groups after treatment. In this case, the researcher might want to use ANOVA, but if he or she has assessed supplementary information, like age or exercise, it would be possible to include this as covariates in the ANCOVA analysis. This adjustment allows a reduction of the observed variation between the groups caused by the covariate and not the treatment itself.

This strategy is also commonly used in quasi-experimental and experimental designs with pre-post assessments and a control group (e.g. Paper II) when the pre scores are not equivalent (even in randomized controlled trials the pre scores might differ). In such cases a significant post score difference may be due to the difference in pre scores. What the ANCOVA does when including one or more pre scores as covariates, is that it analyses whether there would be a significant post score difference when holding the pre scores constant.

In other words, the analysis generates a regression line for both groups; where the independent variable is pre score and the dependent variable is the post score (see Figure 3). If the regression line for one group is significantly elevated over the other, one can assume that the post scores are different.

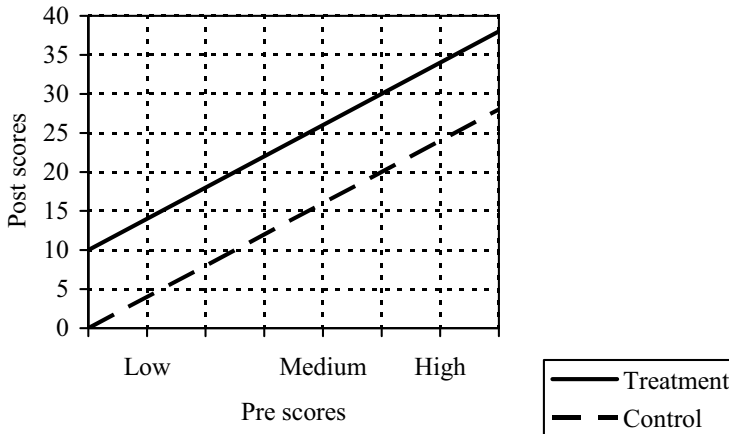


Figure 3. Hypothetical regression lines for an ANCOVA. In this example, the regression line for the treatment group is significantly elevated over the regression line for the control group irrespective of pre scores, thereby indicating a significant difference between the two groups.

### 3.4 Regression

Multiple linear regression analysis calculates the degree to which two or more independent variables (IVs) have a linear relationship with a dependent variable (DV). The inclusion of multiple IVs can increase the explained variance in the DV and enable the researcher to control for confounding variables. Consider the following example: A strong relationship between working in a factory environment and having poor physical health has

been observed. Based on this finding, it may be tempting to conclude that factory work causes poor physical health. However, most of the factory workers in our example are heavy smokers, and we know that heavy smoking is related to poor health outcomes. In this case, smoking is a confounding variable that, once entered in a regression model, will explain poor health and reduce the explained variance from factory work. Regression is usually estimated by means of least squares methods. This method generates regression lines or slopes that give the best fit to the data, i.e. which minimize the distances between the fitted model and the observed values (Tabachnick & Fidell, 2001).

In Paper III, the analyses were carried out with multiple regression analyses, and the dependent variables were change-scores (post – pre). The use of change-scores has previously been criticized because of their inherent unreliability and because of regression towards the mean, while more recent research has suggested that change scores may be sufficiently good estimates of change (Yin & Brennan, 2002).

### **3.5 Missing data**

In all papers, the expectation maximization (EM) procedure was used in order to analyze and replace missing data. EM imputation was performed when items were missing only, thereby leaving out cases missing entire scales. Thus, if a person did not fill out any of the items in a measure (e.g. CBCL), this person was excluded from the analysis on that specific measure. EM is an imputation method using an iterative procedure to fit the most unbiased values (Tabachnick & Fidell, 2001). The EM procedure takes advantage of the observed values and estimates based on these values to generate expected values which replace the missing data. A missing completely at random (MCAR) test was carried out for each EM, and if this test failed, regression analysis was used to impute missing values. EM has been claimed to be superior to more traditional strategies, such as deleting cases with

missing data or mean substitution (means are calculated from the data and used to replace missing data).

## **4 Results**

### **4.1 Summary of Paper I**

“Interparental Collaboration, Parenting and Child Externalizing Behavior in a Clinical Sample: Testing Mediation”

In order to study processes leading to externalizing behavior in children, this paper examined the mediated effect of interparental collaboration on children’s externalizing behavior through maternal and paternal parenting. Also assessed was whether the relation between interparental collaboration, parenting and externalizing behavior was moderated by parent gender (i.e. whether there was a significant difference in how maternal parenting and paternal parenting mediated the effect of interparental collaboration). A clinical sample consisting of 136 families with a child with externalizing problems participated in this cross-sectional study. Structural equation modeling (SEM) was used to test the study hypotheses. The results showed that the combined effects of maternal and paternal parenting fully mediated interparental collaboration and externalizing behavior. When separating the indirect effects by parent gender, paternal parenting functioned as a mediator, whereas maternal parenting did not. Thus, findings indicated that the relation between interparental collaboration, parenting and externalizing behavior was moderated by parent gender.

The present findings suggest that the interparental relationship influences both maternal and paternal parenting practices. This finding is consistent with a number of studies of normative samples and supports the spillover hypothesis, namely that emotions and dynamics generated between parents affect the nature of their interactions with their children

(Erel & Burman, 1995; Krishnakumar & Buehler, 2000). Contrary to expectations, maternal parenting did not mediate the relation between interparental collaboration and child externalizing behavior when paternal parenting was included in the model. Nevertheless, the significant link between paternal parenting and child externalizing behavior underscores the importance of involving fathers in interventions and supports the suggestion that fathers add a unique contribution to child outcomes (Marsiglio, Amato, Day, & Lamb, 2000; Sturge-Apple, Davies, & Cummings, 2006). Taken together, our findings support previous research that has found parenting to be related to child outcomes, and also highlight how positive aspects of the interparental relationship are related to parenting practices and child externalizing behavior.

## **4.2 Summary of Paper II**

“School outcomes of a community-wide intervention model aimed at preventing problem behavior”

The aim of the Paper II study was to investigate whether the implementation of the intervention model “The Early Intervention for Children at Risk of Developing Behavioral Problems” (EICR) would result in fewer incidences of problem behavior and improved the learning climate in elementary schools in a Norwegian municipality. EICR is a community-wide intervention model for preventing and treating problem behavior and promoting social competence in children in the aged 3-12 years. The study was based on a quasi-experimental pre-post design; the municipality was divided in two and each section had equal chance of being assigned to the intervention condition (i.e. receive the EICR model). Participants were principals and school staff. Univariate analyses of covariance (ANCOVA) were run to test for significant differences between the schools in the intervention and comparison area at post-assessment. About one year after initiation of the EICR model (at post assessment), the prevalence of student problem behavior was rated as significantly lower, and student relations

as significantly better for schools located in the intervention area, as compared to schools located in the comparison area. However, the EICR model did not seem to produce similarly positive effects on problem behavior incidents in the school environment. The exploratory nature and the quasi-experimental design of this study calls for precaution when interpreting the results. However, the positive findings support further development, implementation and research on the EICR model.

### **4.3 Summary of Paper III**

“Gender Differences in Intake Characteristics and Behavior Change among Children in Families Receiving Parent Management Training (PMT) “

The study goal of this paper was twofold. The first goal was to examine gender differences among children before their families received PMT. The second goal was to study whether child gender predicted changes in behavioral outcomes from pre to post treatment. A clinical sample consisting of 323 families (children and their parents/caretakers) who received PMT via Child and Adolescent Mental Health agencies and Child Welfare Services across all five health regions in Norway participated in this study. The participating families were invited to assessment sessions before (pre) and after (post) treatment. In line with previous research, findings showed that boys scored higher on parent and teacher ratings of externalizing behavior (but not on the PDR), and that girls were rated by their parents to have more internalizing problems. Teachers did not, however, rate girls to have more internalizing problems than boys. Parents did not report any gender difference in social competence, whereas teachers reported girls to exhibit more social competence than boys. Parent reports indicated that there were more girls in clinical range on externalizing behavior, as compared to boys. Teacher reports, however, indicated that there were more boys in clinical range. On internalizing behavior, parent and teacher reports showed nonsignificant

gender differences of children in clinical range. We did not find a significant gender difference on parent reports of comorbidity, while teacher reports indicated that significantly more boys experienced comorbidity, as compared to girls. The analyses of change revealed that gender predicted change on teacher reported social competence and externalizing behavior, with girls more likely than boys to improve from pre to post treatment. On the remaining outcome variables, no gender differences were evident. Overall, the findings did not indicate that girls were more at risk than boys at intake to treatment. PMTO appeared to be equally effective for boys and girls, and the few gender differences in outcomes showed that girls benefited more from PMTO than boys. PMTO seems to be a flexible intervention model capable of matching treatment to families' needs and strengths, regardless of the child's gender. Based on these findings, we suggest that PMTO may be gender neutral for all children in the range from 4 to 12 years of age.

## **5 Discussion**

### **5.1 Methodological and design issues**

#### **5.1.1 Reliability**

“Reliability refers to the consistence of a measurement procedure, and indices of reliability describe the extent to which the scores produced by the measurement procedure are reproducible. Consider the example of a bathroom scale; if it gives different readings in three successive weightings of the same person, we would hardly call the scale reliable” (John & Benet-Martinez, 2000, pp. 342). Since most measurements (questionnaire scales, observations, structured interviews) in the field of psychology contain error, a whole range of reliability indices have been developed to estimate the degree of error in measurements.



Cronbach's alpha, which is an estimate of internal consistency (the degree of error associated with a particular range of items or observations), is by far the most widely used index of reliability. High internal consistency is obtained when items are homogenous and have content saturation. Cronbach's alpha is the mean of all possible split-half correlations and can be seen as an extension of split-half reliability (John & Benet-Martinez, 2000). Both the interrelatedness of items and the number of items in a measurement will influence the Cronbach's alpha. It is worth noting that the alpha does not indicate the unidimensionality of a measure, and needs to be addressed with other methods, such as confirmatory factor analysis (e.g. Byrne, 2001).

Most of the scales in this thesis have been developed for use in previous studies and, as reported in each of the papers, the Cronbach's alphas across the papers ranged from moderate to high (i.e. from  $\alpha = .65$  to  $\alpha = .97$ ), implying an acceptable level of reliability for the measures used in this thesis.

### **5.1.2 Internal Validity**

*Quasi-experimental designs and internal validity.* The study presented in Paper II was conducted with a quasi-experimental pre-post design, or what also has been called a non-equivalent comparison group design (Shadish, Cook, & Campbell, 2002). The study included an experimental group (or intervention area) and a comparison group (or comparison area). The fact that the units of analysis were not randomly selected to the experimental or comparison condition represents a threat to the internal validity (i.e. whether it can be established that a relation between an IV and a DV reflects a causal relationship from the IV to the DV). While small pre score differences reduce the probability that initial selection biases are influencing the outcomes, the lack of a randomization procedure for the units of analysis makes it impossible to rule out the possibility that other unmeasured variables cause the differences measured at post assessment. In other words, the equality of pretest differences

in a quasi-experimental study can never guarantee that selection bias is absent. This limitation or threat to internal validity should always be kept in mind when considering studies conducted with such designs, and findings need to be replicated in randomized controlled trials before more firm conclusions can be drawn.

*Cross-sectional designs and internal validity.* Paper I was carried out with a cross-sectional design, which represents a threat to internal validity. In contrast to experimental studies, cross-sectional studies cannot establish that the IV precedes the DV in time, which makes inferences about the causal order of the variables problematic (Shadish et al., 2002). In other words, what has been identified as the IV may as well be the DV. This does not mean that cross-sectional studies do not have any value. On the contrary, such studies may be used to provide a basis for future longitudinal and experimental research by exploring new hypotheses and models.

Also, when cross-sectional studies are investigating relationships previously tested, one may want to try verifying the internal validity for such studies by ensuring that the findings correspond with previous findings from other experimental and longitudinal studies. Paper I both replicated previous findings and explored the field. First, it was a replication because it established an indirect link between interparental relationship and externalizing behavior (see Effects of contextual factors on parenting skills), which strengthened the internal validity of the study. Second, the study had some exploratory features since it used a different construct of interparental relationship than previous studies, by focusing on positive aspects of the relationship rather than negative ones. Even though previous findings support the view that interparental relationships indirectly influence externalizing behavior, the exploratory part of the study needs to be replicated in order to strengthen the hypothesized causal order of variables.

### **5.1.3 External validity**

“Most experiments are highly local but have general aspirations” (Shadish, et al., 2002, pp. 18). Simply put, external validity refers to generalizations based on findings from a study to a broader population. The main issue is to which extent we can infer that a relation holds across persons, settings, treatments and outcomes. Both in normal life and in research we make generalizations when we assume that an observed relation of some kind (e.g. harsh discipline relates to high child externalizing behavior) will take place in the future and/or in different settings.

A concern within the realm of external validity is generalizations to the target population that a sample is presumed to represent. Common for the samples in Paper I and III is that they consisted of families who had contacted Child and Adolescent Mental Health agencies and Child Welfare Services across all five health regions in Norway because of child conduct problems. Families were recruited using the regular referral procedures of the agencies. The agencies involved in the study had a rather high threshold for providing services to families and inclusion in the studies was based on clinical judgments rather than formal screening procedures in accordance with procedures typically used in these services. These factors increase the likelihood that the samples represent the population of families with one or more children with serious conduct problems. However, a threat to the external validity of Paper I is the inclusion of two-parent families who participated both in the observational tasks and who filled out the questionnaires. Potentially, the fathers in this study were more involved and better functioning as compared to those who did not meet the inclusion criteria of being an intact family. In order to cancel out this validity threat, findings from this study need to be replicated. The sample in Paper II consisted of 266 out of a total pool of 271 school employees. The inclusion of 98.2 % of the school staff in this municipality

makes it highly likely that the sample represents the population of teachers and other employees in the municipality.

Attrition is a critical aspect of all studies with two or more assessments, and Paper II and III are no exceptions in that respect. In order to get an idea about how much pre-post completers differed from the ones who were lost to post assessment, we compared the groups on background and outcome variables. Small differences between the groups would indicate that completers represented the original sample well. The response rate for Paper II was 81.4 %, and at pre-test there was only one significant difference found between the attrition group and the pre-post completers when compared on background variables and on outcome variable ratings. The responders who dropped out of the study reported more problem behavior incidences observed in the school environment at baseline than the other school staff,  $t(264) = -2.56$ ,  $p < 0.05$ . In Paper III the response rate was 74 %, and there was only one significant difference between the attrition group and the completers when compared on background variables and on child behavior/adjustment variables. The families who dropped out had a significantly older reporting parent than the other families  $t(221) = 2.09$ ,  $p < 0.05$ . The fact that few differences emerged indicated that the pre-post completers represented the original sample fairly well.

Yet another concern is whether findings can be generalized across populations (Shadish, et al., 2002). Generalizations across populations presuppose that one is able to generalize to the target population. For instance, can the findings from Norwegian samples be generalized to populations in other countries or to ethnic minorities? Most of the findings from Paper I and III are consistent with international (Western) findings. The results from Paper I are fairly similar to empirical findings from both normative (Erel & Burman, 1995; Krishnakumar & Buehler, 2000) and clinical samples (e.g. Webster-Stratton & Hammond, 1999), which suggest that the findings may apply to other populations as well. Our findings in

Paper III regarding the percentage of girls who received PMTO (26.9 %) and the gender specific outcomes were comparable to findings from previous studies on gender differences and interventions for conduct problems (Beauchaine et al., 2005; Fossum, Morch, Handegard, & Drugli, 2007; Webster-Stratton, 1996). Generalizations across populations based on findings from Paper II, which was a study of a community-wide intervention model within one municipality, should be done with a high degree of precaution: The study was highly local, by including respondents from one municipality only, and exploratory. Although the promising findings from the study may indicate that the model will produce similar outcomes in other municipalities, findings need to be replicated in order to lay the foundation for more firm conclusions.

Also, all studies in this thesis are limited by their small number of families with an ethnic minority background, and further research is needed in order to find out more about whether findings are valid across ethnic variation. Fortunately, the Norwegian Center for Child Behavioral Development is currently conducting an RCT in a sample of Somali and Pakistani families in Norway, and will probably provide more information about the generalizability of parent management training to these ethnic minorities.

## **5.2 Discussion of main findings**

All papers are based on data from regular community settings where PMTO and EICR interventions have been implemented. Paper I and III used data that was collected for two interconnected studies of PMTO (Ogden, Forgatch, Askeland, Patterson, & Bullock, 2005; Ogden & Hagen, 2008). These two clinical samples are unique for several reasons. First, the samples were relatively large, altogether consisting of more than 300 families who had contacted child and adolescent mental health services to get help with their child's conduct problems. The relatively large sample size made it feasible to study these families before

receiving intervention, which is important in its own right; increased knowledge about these families can help us know more about how they differ from normative samples (as shown in Paper III) and how contextual and proximal variables are related to child outcomes (as illustrated in Paper I). This knowledge does not only apply to those who work with PMTO, but also to other professionals in the field of child conduct problems. Second, the comprehensive PMTO training program, originally developed in the US, was delivered by trained therapists in Norway and this made it possible to study how child gender influenced the outcomes of PMTO as implemented and applied in all health regions in a different country, crossing both national and language borders. Future studies can, with the use of this relatively large sample, investigate other possible moderators (e.g. parental substance use, child age or economical difficulty) and mediators (e.g. treatment fidelity) of PMTO treatment outcomes. Paper II did not only indicate that EICR had positive outcomes, it also showed that it was feasible to implement a community-wide intervention model consisting of multiple intervention modules offered to children at elevated risk of conduct problems (moderate to high risk), their parents and/or teachers in school or kindergarten. During the study period, 64 children were exposed to one or more interventions and 36 professionals were trained to deliver the interventions. The practical work related to the implementation of the EICR model was very time consuming, demanding and informative (Christiansen, 2006), and will help the implementers when they continue to develop and disseminate the model.

Taken together, the papers comprising this thesis demonstrate that it is feasible to import, develop and implement theory- and evidence based interventions at a large scale. This unique effort is a result of a Norwegian nationwide strategy to improve services and efforts offered to children and youth at risk for developing severe conduct problems. The nationwide effort was initiated by the Ministry of Child and Family Affairs in 1997 and is now supported and financed by four ministries (Ogden et al., 2005).

### **5.2.1 The findings support the SIL model**

The findings from the three studies have in common that they, in different ways, support central assumptions in the SIL model. First, the study presented in Paper I support the notion that contextual factors (in this case interparental collaboration) influence child behavior (in this case externalizing behavior) indirectly through parenting skills. The study also expanded earlier studies, which have investigated negative features of the interparental relationship, by including interparental collaboration which is a positive feature of relations between parents. By including a new construct, findings give extended support to the SIL model. It should be noted, however, that although findings generally supported the SIL model, one anomaly appeared: Maternal parenting was, as predicted by the model, influenced by interparental collaboration, but it did not mediate child externalizing behavior when paternal parenting was included in the model. However, as predicted by the SIL model paternal parenting served as a mediator, and the finding supports the notion that fathers add a unique contribution to child outcomes (Marsiglio et al., 2000; Sturge-Apple et al., 2006). Second, findings from Paper II were in accord with the SIL model by showing that the implementation of interventions based on central principles of the model had positive effects on student problem behavior and student relations. Third, the results reported in Paper III showed that PMTO appeared to be at least as effective for girls as for boys. The few gender differences in outcomes showed that girls benefited more from PMTO than boys. Research has suggested that the SIL model applies to both genders in that the same variables (parent inept discipline, family and peer coercion) have been found to predict antisocial behavior among girls and boys (Dishion et al., 1994). However, the current scarcity of evidence, the low number of girls in most outcome studies and the mixed findings available has not made it clear whether PMTO, which is derived from the SIL model, actually will produce similar outcomes for both genders. The fact that our data suggested that PMTO seemed to be working about equally

well for both genders indicates that there is no need for modifications of the intervention based on gender specific differences. This finding carries a message to basic research; the SIL model's assumptions about the development of conduct problems do seem to apply to both boys and girls. These assumptions do, however, need to be assessed in future studies, since conduct problems in girls appear to be under-researched and models for development of antisocial behavior has mostly been validated for boys (Campbell et al. 2000; Capaldi et al., 2002; Patterson, 1986). Overall, the fact that the findings from all papers in this thesis support assumptions in the SIL model suggests that it is a valuable strategy to offer interventions based on the model's principles to children with conduct problems.

### **5.2.2 The bidirectional relation between applied and basic research**

As noted earlier, the basic and applied research conducted in the US has laid the foundation for the interventions examined in the present thesis. The basic research has generated hypotheses about which variables to target in interventions, and applied research has tested these hypotheses in experimental studies. Similarly, the papers in this thesis underline the bidirectional relation between applied intervention research and basic research (Patterson, 2008).

Findings from Paper I, which was a basic research study, provide practical implications by highlighting the importance of interparental collaboration. Helping parents cooperate more effectively does seem to make it easier for parents to interact more positively with their children. Thus, if interventionists detect a lack of collaboration between parents during assessments of a family, or during a parent management intervention, the interparental relationship should also be addressed (Kaczynski, Lindahl, & Laurenceau, 2006; Gerard et al., 2006). Furthermore, findings from Paper II and III, which were applied research studies, provided support for underlying theoretical assumptions in the SIL model by showing that



interventions based on the model seemed to ameliorate child conduct problems. A central aspect of both the SIL model and the interventions tested in this thesis is that coercion between the child and individuals in the environment (i.e. aggressive and aversive behaviors) occur, given that the behaviors are functional in terminating others attempts to change or control the individual's behavior (Patterson, 1982; Snyder & Stoolmiller, 2002). As previously described, the interventions tested in Paper II and III share a common focus on reducing coercion between the child and the environment (parents, kindergarten or school teachers or peers). Thus, the present findings are consistent with observational and longitudinal studies that have shown coercion to predict child conduct problems (Campbell et al., 2000; Snyder, 2002; Snyder & Patterson, 1995).

### **5.3 Future directions**

Although the development and refinement of effective interventions aimed at reducing and preventing conduct problems has been a prioritized research task in recent years, much is still undone as a substantial proportion of the treated children do not respond well to intervention (Webster-Stratton et al., 2004). In support of this notion, results from Paper III indicated that, when reported by parents, 42.2 % of the girls and 39.7 % of the boys reduced their pre-to-post treatment externalizing behavior from clinical to non-clinical range. According to teacher reports, 28.6 % girls and 23.3 % boys reduced their externalizing behavior from pre to post. This implies that a substantial number of the children, who were in clinical range before treatment, still were in that range after treatment. Additionally, a recent meta-analysis showed that effect sizes for parent training interventions were moderate (average  $d = .42$ ) at post assessment and small (average  $d = .21$ ) at follow up assessment on measures of child externalizing behavior (Lundahl et al., 2006). These results indicate that treatment efforts can be improved.

Furthermore, Ogden and Hagen (2008) found that PMTO seemed to be particularly beneficial for children younger than 8 years, while these findings did not emerge for children older than 8 years. This suggests that child age moderates the effectiveness of PMTO. The finding may be seen in light of the SIL model, which postulates that deviant peer adaptation becomes more salient as children grow older (e.g. Dishion & Patterson, 2006). Perhaps this implies that interventions aimed at reducing conduct problems need to adjust its focus depending on the age of the focal child? One may speculate that PMTO would achieve better outcomes for older children with an increased focus on parental monitoring and by including schools to a larger degree, maybe by adding teacher interventions for the children who experience severe problems in the school context. Although results from the Norwegian RCT suggested that younger children benefited more than older ones, a meta-analysis demonstrated that parent training interventions seemed robust against age effects (Lundahl et al., 2006). This contradictory finding illustrates that more research is needed regarding age as a possible moderator of treatment success.

The findings from Paper I indicated that interparental collaboration influenced maternal and paternal parenting. As suggested in the article, lack of collaboration between parents may have deteriorating consequences for the outcomes of parent training interventions. Therefore, just like child age, interparental collaboration may be an important moderator of the effectiveness of parent training interventions. In support of this notion, Webster-Stratton (1994) found evidence suggesting interventions to be more effective when addressing both interparental conflict and parenting.

A question emerges when considering the fact that a number of children do not seem to respond well to treatment: When is it proper to add intervention modules to parent management training interventions? Webster-Stratton et al. (2004) found that combining parent training with either a child or teacher training module was an effective approach to

treating children's conduct problems. However, Webster-Stratton et al. noted that the unique effects of child training or parent training alone fared better than they had expected. They concluded that combining parent training with one intervention (either child training or teacher training) would produce slightly better results than parent training alone and similar results as combining parent training with two other interventions. Correspondingly, Kazdin et al. (1992) found that the combination of parent management training and child training was more successful than either treatment alone. Opposed to these findings (and in contrast to conventional wisdom), Lundahl et al. (2006) found that adding intervention modules to parent management training did not produce better outcomes than parent management training alone. This study was, however, hampered by the fact that only parent-reported outcomes were included, which is a serious flaw since additional interventions are offered in other contexts (often the school context), and effects are most often observed in the context where the interventions are delivered (Webster-Stratton et al., 2004). The validity of the findings would have been strengthened if the study had included multiple informants (e.g. parents and teachers).

None of the above studies directly addressed the question of matching and tailoring interventions to children's problematic behaviors in different settings (at home, at school or with peers), since children who were assessed to be within clinical range before treatment were randomly assigned to either one or multiple interventions, regardless of their risk factor profile (e.g. if the problems were apparent in one or multiple settings).

In a recent preventive trial, families were randomly assigned to the "Family Check-Up" (FCU) or to a control condition (Dishion et al., 2008). The results revealed that the FCU had positive effects on behavior problems and caregivers' positive behavior support. The length and focus of the intervention was based on initial assessments of the families and children and was thereby tailored to their needs. Therefore, dosage and components delivered

to families varied, in contrast to conventional parent management training interventions that often consist of a more rigid curriculum of core components. The FCU has also been developed for adolescents, and findings showed that the intervention resulted in reduced drug use, problem behavior and parent monitoring (Connell, Dishion, Yasui, & Kavanagh, 2007). This promising approach, which is similar to procedures currently being developed for the EICR model (Christiansen, 2006), may with its integrated flexibility be able to help children that do not respond well to a single type of intervention. In order to elaborate on the promising findings by Dishion and colleagues, future research efforts should compare the effects of parent training only (i.e. only one type of intervention regardless of severity and pervasiveness of conduct problems) with parent training combined with other interventions, based on initial risk factor assessments (e.g. a child displaying severe conduct problems at home and in school would receive intervention in both arenas).

As evidenced by the mixed findings above, researchers should continue to conduct effectiveness trials (as opposed to efficacy trials) on interventions in real world settings. Treatment effectiveness signifies whether an intervention works when carried out in regular practice, and is a decisive factor for successful interventions (Chambless & Hollon, 1998). Not only should experimental trials be carried out in the real world, they should be carried out with rigorous designs and large samples, enabling the detection of moderators and mediators of change in order to be more beneficial to children and families in need of help. In that way, future research can increase our knowledge and improve efforts for children at risk for pervasive, frequent, severe trajectories of conduct problems and antisocial behavior.

Along with continued intervention research, research efforts should be made to gain more knowledge about the processes related to the implementation of evidence based practices in real world settings among community based organizations and professionals (Taylor & Biglan, 1998). Glisson (2007) recently claimed that our empirical knowledge is

much more limited when it comes to implementing effective interventions in community based agencies, as compared to our knowledge about the efficacy of evidence based practices. One question that has emerged within the field of implementation research relates to how one can assure that professionals at the community level will practice evidence based interventions with high treatment fidelity (i.e. adherent and competent execution of the intervention). The reason why treatment fidelity has become a topic of interest is because high treatment fidelity has been found to be related to successful outcomes for families (Henggeler, Melton, Brondino, Scherer, & Hanley, 1997). The innovative work of Forgatch, Patterson and DeGarmo (2005) has showed that treatment fidelity to PMTO could be assessed with an observation based measure, and that this measure predicted change in parenting skills from pre to post treatment. This might suggest that it would be beneficial to measure fidelity on a regular basis in real world settings in order to sustain the quality of the services delivered to families (Fixsen, Naoom, Blase, Friedman & Wallace, 2005). Therefore, the use of valid and reliable treatment fidelity measures seems important when large scale implementations of interventions are carried out. Another question of importance is to increase the use of evidence based interventions in real world settings (Biglan, 1995). A precondition for achieving a widespread, sustainable and effective use of evidence practice is to improve the understanding of contextual characteristics within organizations (such as organizational culture, structure, climate and work attitudes) that impede or facilitate implementation processes (Glisson, 2002). In other words, which factors affect whether an evidence based practice will be adopted, sustained and delivered effectively to families in need of help? By understanding these characteristics, future implementation efforts can more easily identify the critical organizational factors that increase the likelihood that evidence based interventions will be offered and carried out with rigor and high quality.

## 6 Conclusions

The present thesis had the dual goal of (a) adding to the understanding of how interparental collaboration and parenting practices influence conduct problems and (b) contribute to the development of effective interventions for children with moderate to severe conduct problems in Norway. The main findings can be summarized as follows:

1. Findings from Paper I showed that the influence of interparental collaboration on child conduct problems was mediated through parenting in a clinical sample. This implies that ameliorating interparental collaboration may indirectly increase the effectiveness of parent training interventions: Helping parents cooperate more efficiently seems to make it easier for parents to interact more positively with their children. This suggests that if interventionists detect a lack of collaboration between parents during assessments of a family or during a parent training intervention, the interparental relationship should also be addressed. Findings from Paper I indicate that it may be a promising strategy to address interparental communication skills, teamwork and consensus.
2. The findings from Paper II suggest that future efforts should be made (a) to implement theory-based and systematic community-wide models, and that (b) these models should be evaluated in order to gain more knowledge about their effectiveness and the factors that impede or facilitate implementation processes of community-wide models.
3. We could not find any evidence suggesting that boys benefited more from PMTO than girls, and the few gender differences we found suggested that girls actually profited more from the intervention. The lack of gender differences does not, however, suggest

that PMTO works well for all children; rather it implies that gender is not the first moderator to address if one wants to improve the treatment effectiveness of PMTO. Other moderators, such as child and family characteristics may to a larger extent influence the outcomes of PMTO and should be addressed in future studies.

4. Although all papers examined hypotheses based on previous theory, they all were hampered by certain weaknesses. For instance, Paper I was carried out with a cross-sectional design, Paper II was based on a quasi-experimental design and Paper III did not include a control group. The weaknesses and exploratory nature of these papers call for precaution when interpreting the findings and suggest that replications are needed in future studies.
5. As noted, in different ways all three papers supported the SIL model and the long-lasting and ongoing research conducted by many different research teams. Although more research is needed, the papers indicate that key assumptions of the SIL model are generalizable to a Norwegian setting. Therefore, findings suggest that it may be a valuable strategy to offer interventions based on the model's principles to children with conduct problems in Norway.

The present thesis has tried to explore the applicability and underlying assumptions of theory- and evidence based interventions in real world settings. Hopefully, this thesis can add to the existing literature by offering some new findings and directions for practice and research. Moreover, it is my hope that this thesis can contribute to the development, refinement and implementation of efforts to prevent and treat severe, stable and pervasive

conduct problems, which can, unless interrupted, develop into persistent adult antisocial behavior and criminal involvement.



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